RECEIVED

AUG 10 1992

DIVISION OF
OIL GAS & MINING

Mine # M/035/009
File incoming
Record # 1991 7/1/1992
Doc. Date 8.10.92
Recd. Date 8.10.92

jbr

CONSULTANTS GROUP

SALT LAKE CITY • RENO • CEDAR CITY

M/035/009

BP Minerals America
1515 Mineral Square
Salt Lake City, Utah 84112
(801) 322-7000
FAX (801) 583-3129

BP MINERALS AMERICA

April 13, 1988

TO: G. Boyce

FROM: J. Pilz

SUBJECT: **Stability Analyses - Proposed Mel-Co Rock Waste Dumps**

This letter summarizes stability analyses conducted for the proposed Mel-Co mine waste dumps, part of the Barneys Canyon Project in Salt Lake County, Utah. This work was performed as an addendum to the "Geotechnical Investigation Report, Waste Rock Dumps, Barneys Canyon Project, Salt Lake County, Utah", submitted by Sergent, Hauskins & Beckwith (SHB) dated January 21, 1988. The purpose of the current study is to analyze the stability of rock waste dumps for the proposed Mel-Co pit.

Two sections of the proposed Mel-Co waste dumps were analyzed. Input parameters included the waste dump layout shown on Mine & Mill Engineering drawing No. 2-00-209 (Figure 1), and soil properties based on reconnaissance mapping and the SHB report. The two sections analyzed are believed to be the approximate critical sections (with respect to stability) for these rock waste dumps.

WASTE DUMP CONSTRUCTION

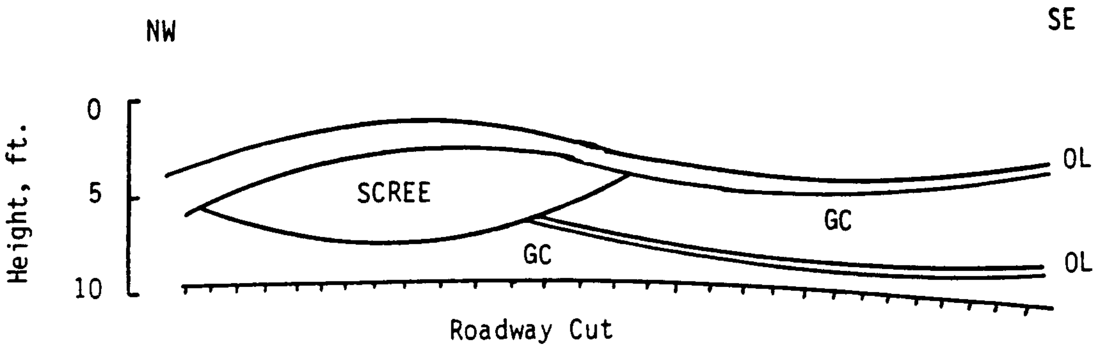
The proposed waste dumps will be constructed by typical end dumping placement techniques using trucks. Haulage levels will vary from elevation 7100 to 7300 feet. This will create rock waste dumps with vertical heights (measured vertically below the crest) of approximately 270 to 310 feet. The maximum elevation difference from crest to toe for the overall terraced dump will be on the order of 500 feet.

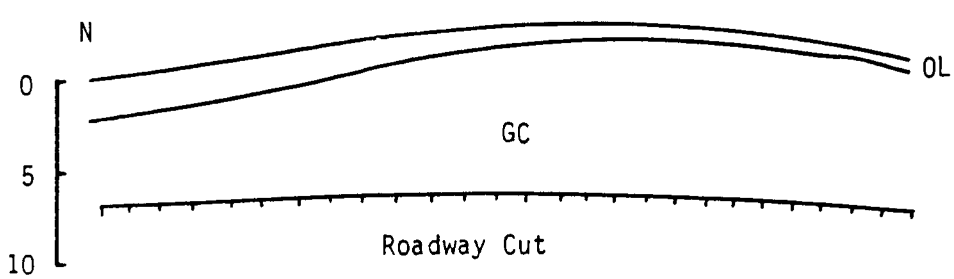
The proposed Mel-Co dump configuration is shown on Figure 1. The waste dumps will fill the upper portion of two drainages to the southeast of the Mel-Co pit. Stream water will be rerouted to avoid dump saturation. No specialized pretreatment of the dump foundation soils is assumed due to the steep existing topography which provides difficult working conditions for construction equipment.

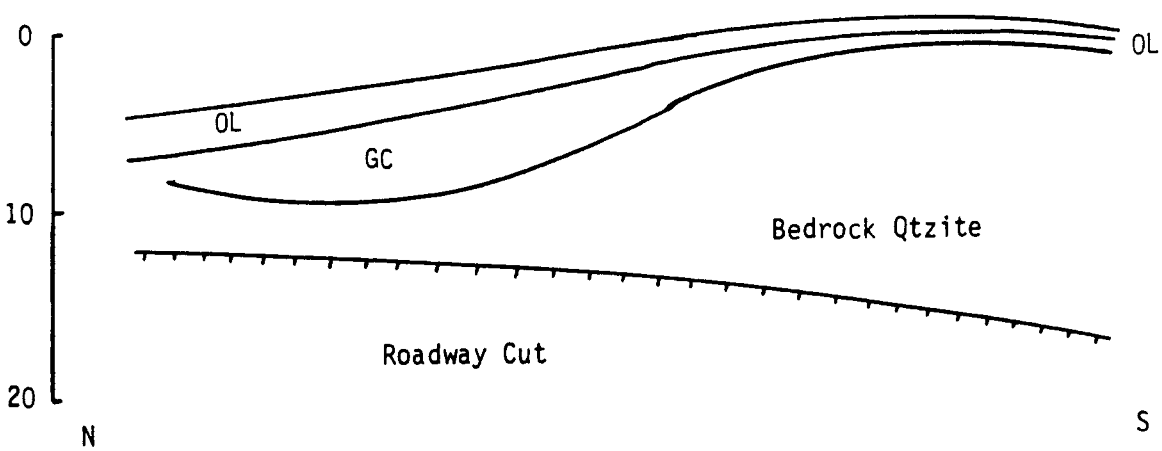
FOUNDATION SOILS

The foundation soils below the proposed Mel-Co dumps were examined by logging and sampling existing roadcuts between elevation 7150 to 7200 feet on April 11, 1988. Several foundation soil samples were obtained by shallow excavation into the roadcut slopes for laboratory testing.

In general, the soils observed in the roadcuts consist of six inches to approximately two feet of organic clayey gravel, underlain by up to eight feet of clayey gravel to gravelly clay, with isolated areas of scree (angular rock), underlain by fractured quartzite bedrock. The thickness of these units was variable. Generally, the greatest thicknesses of the soil materials were observed within the drainages and diminished along the ridges. Sketches of three typical foundation soil road cuts follow:







The uppermost organic soils consist of clayey gravels containing numerous fine to medium size roots. The gravel to cobble size constituents are subangular to angular. These soils are in a moist to very moist condition and low to medium plasticity. Color is very dark brown to black. Thickness ranges from less than six inches up to two feet.

The majority of the soil exposures were composed of a clayey gravel to gravelly clay. These soils also contain angular to subangular cobble size constituents. Gradation analyses and Atterberg limit tests on representative samples are attached. The clay matrix is moist to very moist and low to medium plasticity. Density appears to be medium dense, based on observations of a Cat D-8 dozer performance. Some wet layers were observed, indicating surface runoff had infiltrated into the gravelly clays. Thickness of the clayey gravels varied from nil up to approximately eight to ten feet. This gravel appeared to have formed as a residual soil from weathering of the underlying quartzite bedrock.

An isolated area of scree was intercepted along one roadcut. The scree consisted of angular quartzite in gravel to boulder size fragments. The soil interstices consisted of silt, sand and a trace of clay. Maximum thickness of the scree was approximately 8 1/2 feet.

Weathered bedrock materials were observed along a majority of the roadcut. The bedrock included fractured quartzite with occasional siltstone layers. The bedding fractures were steeply dipping into the slope. Bedrock required ripping using a caterpillar D-9 dozer equipped with a three-tooth hydraulic ripper. The resulting materials consisted of angular clayey gravel.

STABILITY ANALYSES

The stability of the two critical dump cross sections was analyzed using the identical computer program as employed by SHB: STABL2. Input strength parameters for the rock waste and foundation soils were obtained from the SHB report because of the general similarity between the Barneys and Mel-Co materials. The calculations included static stability analyses using the computer routines for circular failure surfaces, non-circular surfaces, and block sliding. Following the static analyses, a pseudo-static approach was employed to calculate factors of safety for earthquake generated horizontal accelerations ranging from 0.05 to 0.40g.

Input Parameters

The shear strength parameters used for the waste rock were identical to the SHB report values ($\varnothing$ = 37 degrees and Cohesion = 0). Due to the limited foundation soil information, conservative soil foundation shear strengths, were employed; the SHB average input parameters ($\varnothing$ = 29 degrees and Cohesion = 1500 psf) and lowest values (Ø = 24 degrees and Cohesion = 900 psf) were selected (see Figure 1, SHB report). Based on our observations along existing road cuts below the dumps, the foundation soil was modeled conservatively as a uniform layer approximately twenty feet thick. The actual thickness is anticipated to vary from near zero along the ridges up to twenty feet within the drainages, including the uppermost organic layers.

The shear strength of the quartzite bedrock was conservatively estimated to be Ø=45 degrees and Cohesion = 5000 pfs. These shear strength parameters create a lower bound for the critical failure surface, forcing the searching routine of STABL2 to analyze failure surfaces passing through the foundation soils and/or waste rock.

Static Analyses

Results of the static analyses are shown on Figures 2 and 3. The analyses indicate that the critical failure surface for Section E is located near the crest of the waste dump and passes through the foundation soils near the toe of the dump. The calculated static factor of safety is 1.26. Comparison between the circular and noncircular failure surfaces generated by STABL2 indicate that the critical surface is of a circular shape. The critical surface for Section D was found to be a circle within the rock waste materials. The calculated static factor of safety was on the order of 1.3. Computer printouts of the critical failure surface stability analyses are included in Attachment A.

Foundation strength sensitivity analyses were conducted by reducing the foundation soil shear strength input parameters until a factor of safety equal to unity was calculated. Results for Section E were as follows:

	Foundation Soil Input Parameters		
	Angle of Internal Friction Ø (Phi)	Cohesion, psf	F. S.
Case 1	29	1500	1.42
Case 2	24	900	1.26
Case 3	19	1500	1.03

Based on the field investigation and soil shear strength testing for similar soil materials, Case 2 soil strength input parameters are believed to be conservative for the Mel-Co dump.

Pseudo-Static Analyses

The seismic stability of the waste dumps was investigated employing the pseudo-static approach. The methodology, input parameters and computer program all follow those previously described in the SHB report. Horizontal seismic accelerations ranging from 0.05g to 0.40 g were employed. A plot of Factor of Safety versus horizontal acceleration is shown on Figure 4 and a summary is provided in Table I. The results closely parallel those obtained by SHB for the Barneys Canyon dumps and indicate that similar deformation should result from the anticipated horizontal accelerations described in the SHB report.

Supporting computer calculations for two of the pseudo-static analyses are being retained in our files.

CONCLUSIONS AND RECOMMENDATIONS

The analyses performed for this study were based on a reconnaissance of roadcuts in the area of the waste dumps and representative strength parameters developed by SHB. Results indicate that the dumps should be stable, employing what are believed to be conservative foundation soil shear strength parameters.

REGISTERED PROFESSIONAL ENGINEER
No. 7224
JOERGEN PILZ
State of Utah

JP/gm

J. Pilz, PE

cc: W. L. Jacobsen
G. D. Schurtz
C. F. Smith
Z. M. Zavodni
R. Bayer, JBR Consultants (3 copies)

SECTION D

MEL-CO ROCK DUMP FACILITY

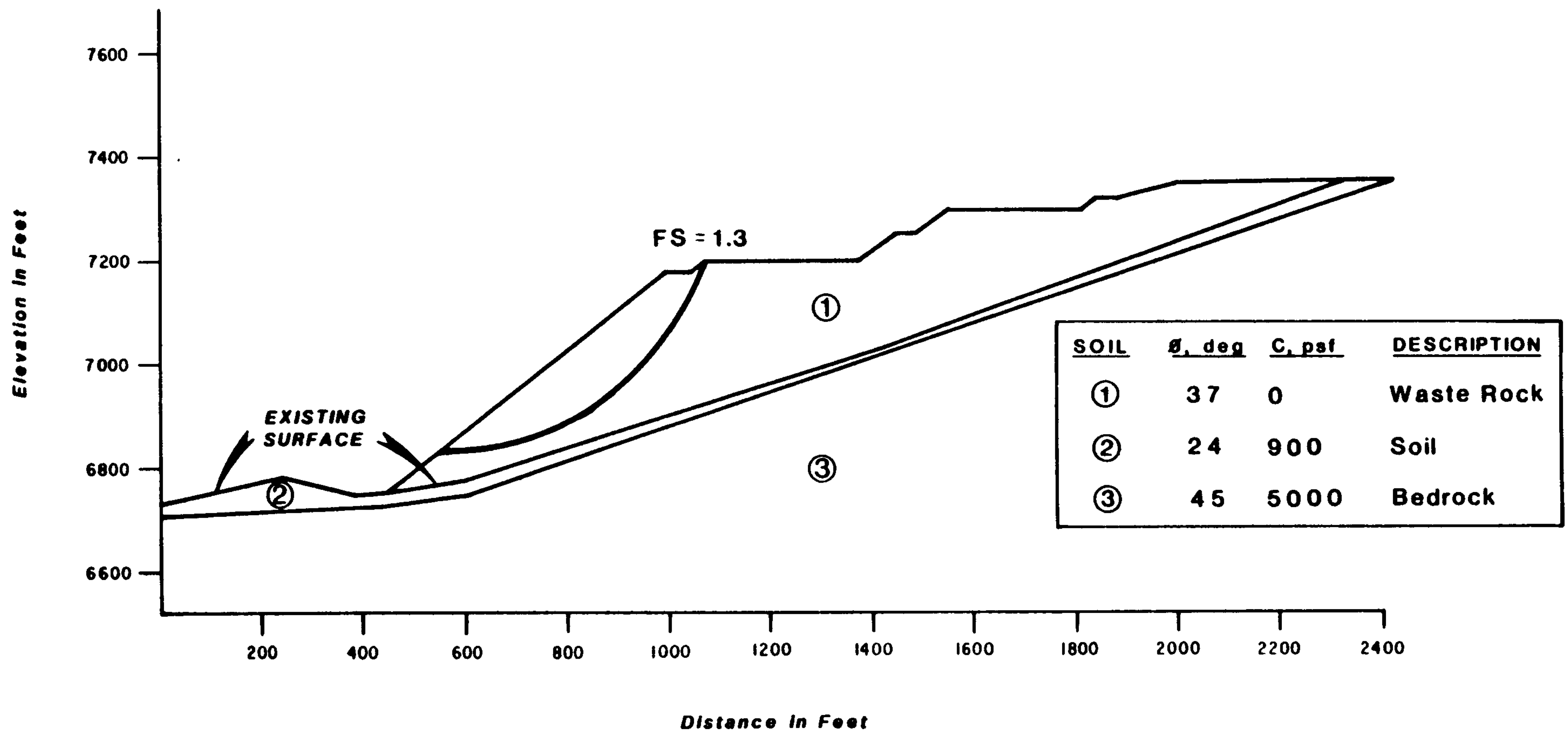
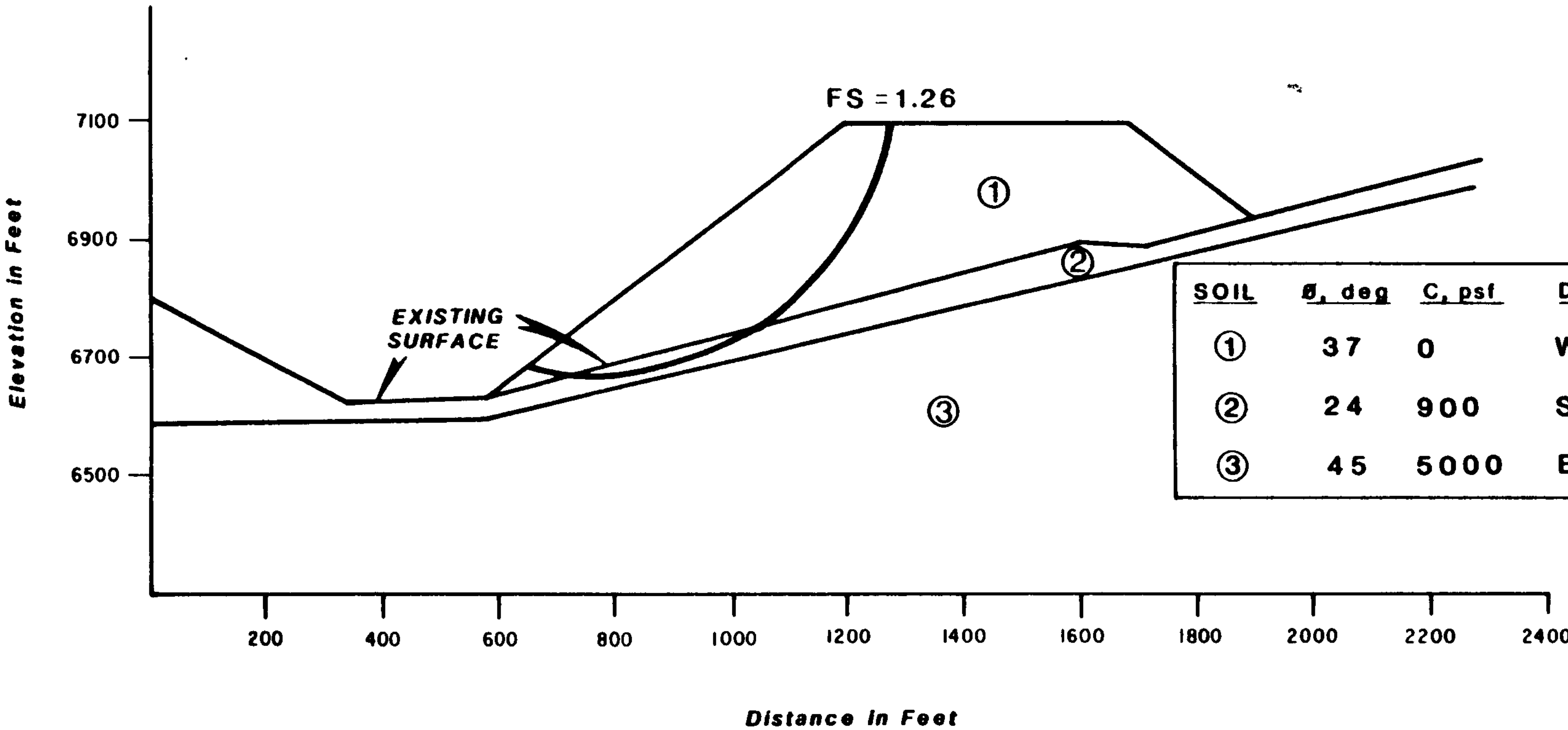


Figure 2

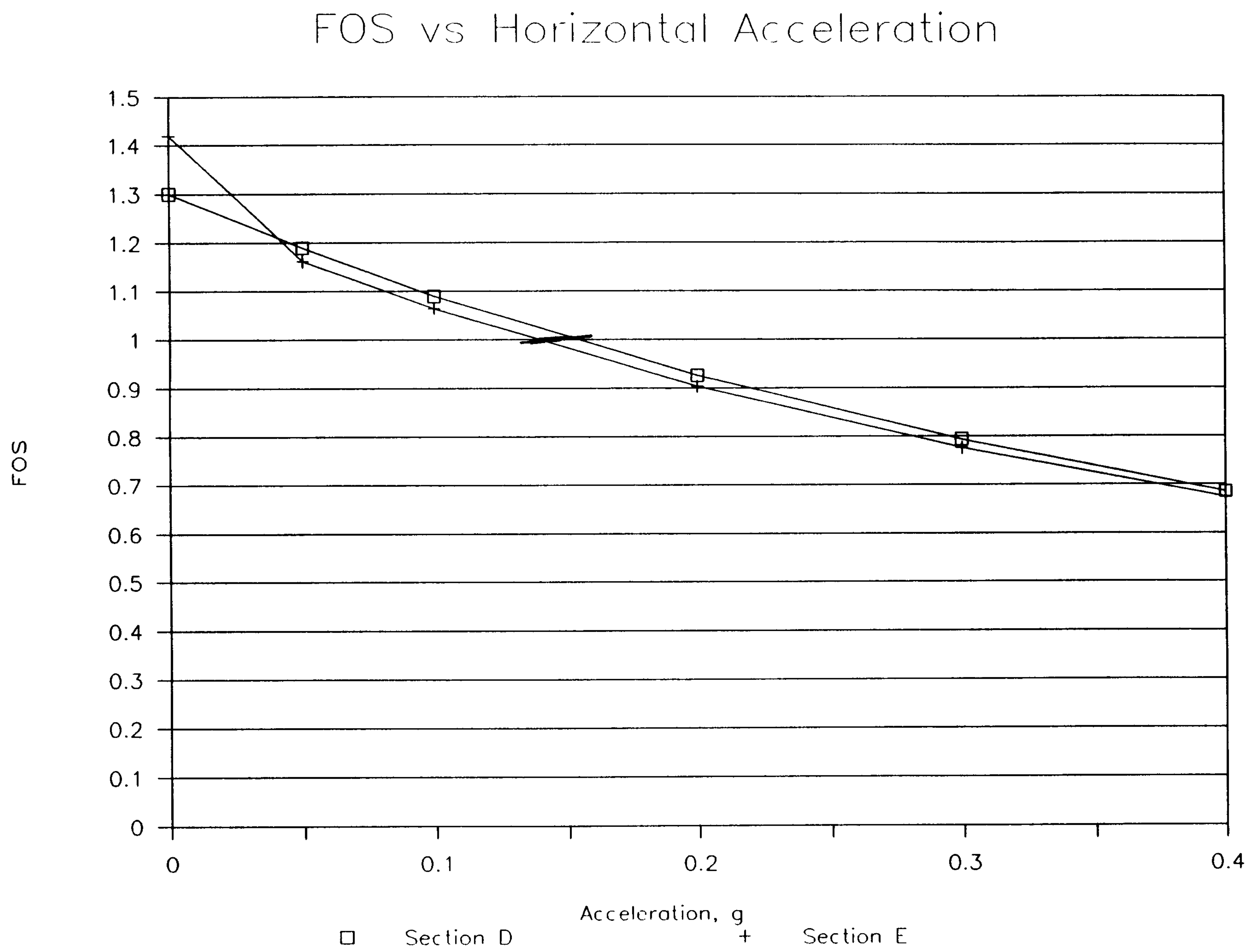
SECTION E

MEL-CO ROCK DUMP FACILITY



SOIL	Ø, deg	C, psf	DESCRIPTION
①	37	0	Waste Rock
②	24	900	Soil
③	45	5000	Bedrock

Figure 3



FOS vs Horizontal Acceleration
FOS
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
Acceleration, g
Section D
Section E

Figure 4

TABLE I - F. S. VS ACCELERATION

Accel, g	Section D	Section E
0.00	1.30	1.42
0.05	1.19	1.16
0.10	1.09	1.06
0.20	0.93	0.90
0.30	0.79	0.78
0.40	0.69	0.67

TABLE II - GRADATION ANALYSES

Sample No.	1	2	3
Description	Clayey Gravel	Clayey Sand w/Gravel	Clayey Sand w/Gravel
Classification	GC	SC	SC
Sieve Size	Percent Passing		
3"			100
2"	100		94
1½"	85		86
1"	77		86
3/4"	72	100	79
1/2"	57	97	73
3/8"	51	92	70
No. 4	46	72	56
10	42	43	45
16	41	34	41
40	41	28	38
100	40	27	36
200	37	25	33

ATTACHMENT A

COMPUTER PRINTOUT OF CRITICAL CASES

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

Case 6

RUN DATE : 04/11/ 88 TIME : 15:20: 39

PROBLEM DESCRIPTION   MELCO DUMP-SECTION B (4/11/88)
"D"

BOUNDARY COORDINATES

14 TOP BOUNDARIES
18 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	210.00	240.00	260.00	2
2	240.00	260.00	380.00	230.00	2
3	380.00	230.00	450.00	230.00	2
4	450.00	230.00	1000.00	660.00	1
5	1000.00	660.00	1050.00	660.00	1
6	1050.00	660.00	1070.00	680.00	1
7	1070.00	680.00	1380.00	680.00	1
8	1380.00	680.00	1450.00	730.00	1
9	1450.00	730.00	1490.00	730.00	1
10	1490.00	730.00	1550.00	780.00	1
11	1550.00	780.00	1810.00	780.00	1
12	1810.00	780.00	1840.00	800.00	1
13	1840.00	800.00	2000.00	830.00	1
14	2000.00	830.00	2330.00	830.00	1
15	450.00	230.00	600.00	260.00	2
16	600.00	260.00	2330.00	830.00	2
17	.00	190.00	450.00	210.00	3
18	450.00	210.00	2330.00	810.00	3

ISOTROPIC SOIL PARAMETERS

3 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	.0	37.0	.00	.0	1
2	125.0	125.0	900.0	24.0	.00	.0	1
3	165.0	165.0	5000.0	45.0	.00	.0	1

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

100 TRIAL SURFACES HAVE BEEN GENERATED.

10 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 200.00 FT.
AND X = 600.00 FT.

EACH SURFACE TERMINATES BETWEEN X =1000.00 FT.
AND X =2000.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION AT WHICH A SURFACE EXTENDS IS Y = 50.00 FT.

50.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

RESTRICTIONS HAVE BEEN IMPOSED UPON THE ANGLE OF INITIATION.
THE ANGLE HAS BEEN RESTRICTED BETWEEN THE ANGLES OF -45.0 AND 5.0 DEG.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

FAILURE SURFACE SPECIFIED BY 15 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	555.56	312.53
2	605.53	314.22
3	655.11	320.63
4	703.87	331.70
5	751.37	347.33
6	797.17	367.38
7	840.87	391.68
8	882.08	419.99
9	920.43	452.08
10	955.57	487.65
11	987.19	526.38
12	1015.01	567.92
13	1038.78	611.91
14	1058.28	657.95
15	1063.04	673.04

*** 1.301 ***

FAILURE SURFACE SPECIFIED BY 17 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	555.56	312.53
2	605.48	315.30
3	655.11	321.35
4	704.24	330.65
5	752.65	343.16
6	800.13	358.82
7	846.48	377.58
8	891.50	399.34
9	934.99	424.01
10	976.76	451.49
11	1016.63	481.65
12	1054.44	514.38
13	1090.01	549.51
14	1123.20	586.91
15	1153.85	626.41
16	1181.84	667.84
17	1188.94	680.00

*** 1.427 ***

FAILURE SURFACE SPECIFIED BY 24 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	600.00	347.27
2	650.00	347.15
3	699.97	348.87
4	749.84	352.44
5	799.55	357.84
6	849.03	365.07
7	898.20	374.12
8	947.01	384.97
9	995.38	397.62
10	1043.25	412.05
11	1090.56	428.23
12	1137.24	446.14
13	1183.23	465.77
14	1228.47	487.07
15	1272.88	510.03
16	1316.42	534.61
17	1359.02	560.79
18	1400.63	588.51
19	1441.19	617.75
20	1480.64	648.47
21	1518.94	680.62
22	1556.02	714.16
23	1591.84	749.05
24	1621.36	780.00

*** 2.124 ***

FAILURE SURFACE SPECIFIED BY 20 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	333.33	240.00
2	381.60	226.96
3	430.87	218.45
4	480.72	214.54
5	530.72	215.26
6	580.43	220.60
7	629.43	230.52
8	677.31	244.94
9	723.65	263.73
10	768.04	286.73
11	810.12	313.74
12	849.52	344.53
13	885.89	378.83
14	918.94	416.36
15	948.36	456.78
16	973.92	499.75
17	995.39	544.91
18	1012.59	591.86
19	1025.37	640.20
20	1028.68	660.00

2.135

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	333.33	240.00
2	381.66	227.15
3	430.84	218.15
4	480.57	213.03
5	530.56	211.83
6	580.48	214.57
7	630.04	221.22
8	678.92	231.74
9	726.82	246.07
10	773.45	264.11
11	818.52	285.77
12	861.75	310.90
13	902.87	339.34
14	941.63	370.93
15	977.78	405.46
16	1011.12	442.73
17	1041.42	482.51
18	1068.50	524.54
19	1092.20	568.56
20	1112.36	614.32
21	1128.87	661.51
22	1133.75	680.00

*** 2.232 ***

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	244.44	259.05
2	290.67	239.98
3	338.38	225.04
4	387.22	214.34
5	436.82	207.97
6	486.78	205.98
7	536.72	208.37
8	586.26	215.14
9	635.01	226.23
10	682.61	241.55
11	728.68	260.98
12	772.86	284.39
13	814.82	311.57
14	854.24	342.34
15	890.80	376.44
16	924.23	413.62
17	954.27	453.59
18	980.69	496.04
19	1003.29	540.65
20	1021.88	587.06
21	1036.33	634.93
22	1041.55	660.00

2.234

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

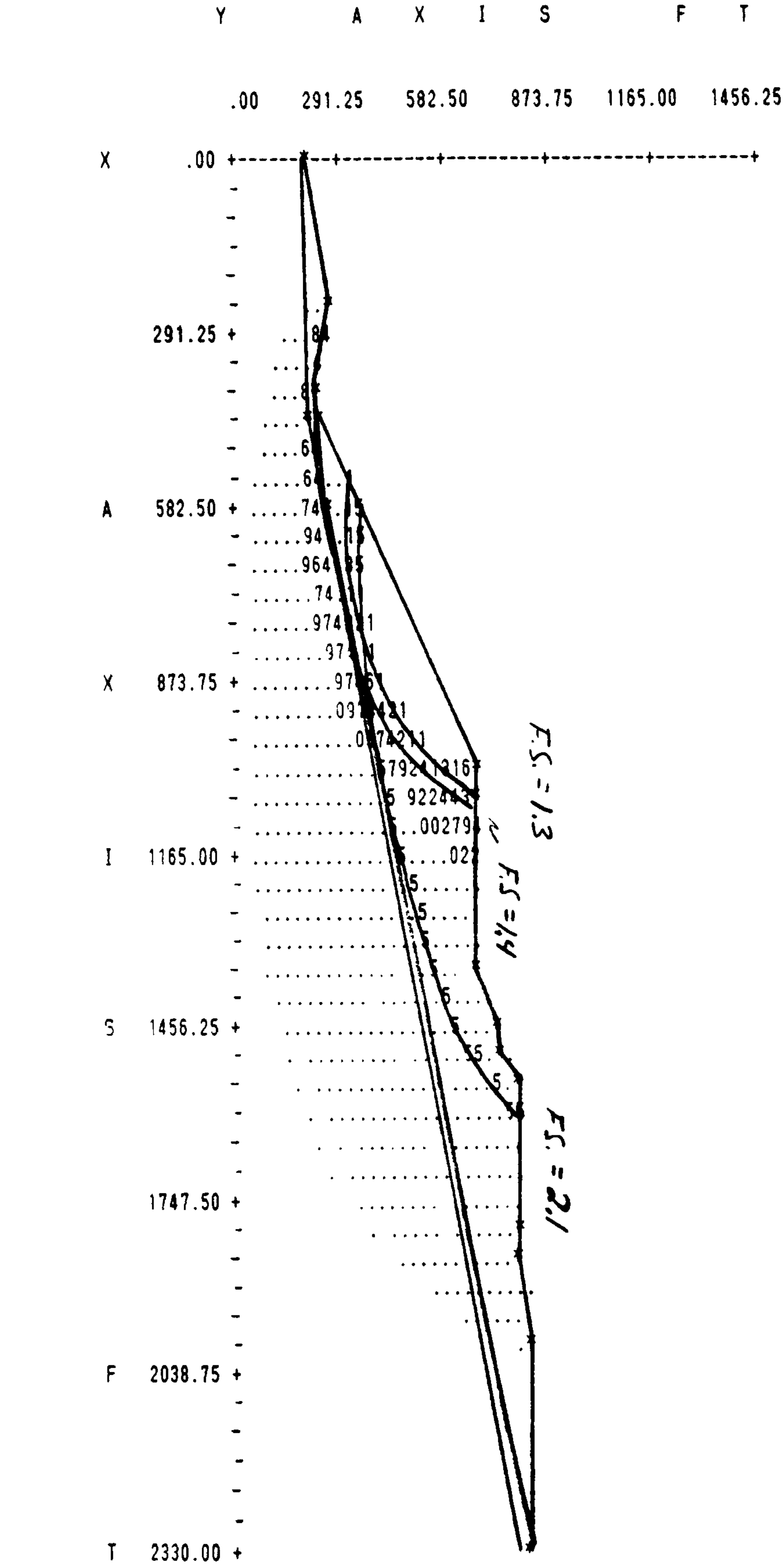
POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	333.33	240.00
2	380.71	224.03
3	429.27	212.10
4	478.66	204.31
5	528.53	200.70
6	578.53	201.31
7	628.29	206.12
8	677.48	215.11
9	725.73	228.20
10	772.72	245.32
11	818.09	266.32
12	861.53	291.08
13	902.73	319.40
14	941.41	351.09
15	977.27	385.93
16	1010.08	423.66
17	1039.59	464.02
18	1065.60	506.72
19	1087.92	551.47
20	1106.40	597.93
21	1120.90	645.78
22	1128.19	680.00

*** 2.399 ***

FAILURE SURFACE SPECIFIED BY 24 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	288.89	249.52
2	335.47	231.36
3	383.32	216.84
4	432.14	206.03
5	481.64	199.02
6	531.54	195.83
7	581.54	196.49
8	631.33	200.99
9	680.64	209.31
10	729.15	221.40
11	776.60	237.18
12	822.69	256.56
13	867.15	279.43
14	909.72	305.66
15	950.15	335.07
16	988.20	367.52
17	1023.64	402.79
18	1056.26	440.68
19	1085.87	480.97
20	1112.29	523.42
21	1135.38	567.77
22	1154.98	613.77
23	1170.98	661.14
24	1175.78	680.00

2.482



CIRCULAR

3 Soils

	ϕ	C
1)	37	0
2)	24	900
3)	45	5000

Mon 4-11-1988

E:\STABL>TYPE SECTB.OT3

--SLOPE STABILITY ANALYSIS--
SIMPLIFIED JANBU METHOD OF SLICES
IRREGULAR FAILURE SURFACES

RUN DATE : 04/11/ 88 TIME : 15:17: 31

Case 2

PROBLEM DESCRIPTION MELCO SECTION A (4/11/88)

"E"

BOUNDARY COORDINATES

6 TOP BOUNDARIES
10 TOTAL BOUNDARIES

BOUNDARY NO.	X-LEFT (FT)	Y-LEFT (FT)	X-RIGHT (FT)	Y-RIGHT (FT)	SOIL TYPE BELOW BND
1	.00	500.00	330.00	320.00	2
2	330.00	320.00	570.00	330.00	2
3	570.00	330.00	1200.00	800.00	1
4	1200.00	800.00	1680.00	800.00	1
5	1680.00	800.00	1900.00	640.00	1
6	1900.00	640.00	2200.00	600.00	2
7	570.00	330.00	1600.00	590.00	2
8	1600.00	590.00	1700.00	710.00	2
9	.00	290.00	570.00	300.00	3
10	570.00	300.00	1900.00	600.00	3

ISOTROPIC SOIL PARAMETERS

3 TYPE(S) OF SOIL

SOIL TYPE NO.	TOTAL UNIT WT. (PCF)	SATURATED UNIT WT. (PCF)	COHESION INTERCEPT (PSF)	FRICTION ANGLE (DEG)	PORE PRESSURE PARAMETER	PRESSURE CONSTANT (PSF)	PIEZOMETRIC SURFACE NO.
1	130.0	130.0	.0	37.0	.00	.0	1
2	125.0	125.0	900.0	24.0	.00	.0	1
3	160.0	160.0	5000.0	45.0	.00	.0	1

A CRITICAL FAILURE SURFACE SEARCHING METHOD, USING A RANDOM
TECHNIQUE FOR GENERATING CIRCULAR SURFACES, HAS BEEN SPECIFIED.

50 TRIAL SURFACES HAVE BEEN GENERATED.

5 SURFACES INITIATE FROM EACH OF 10 POINTS EQUALLY SPACED
ALONG THE GROUND SURFACE BETWEEN X = 200.00 FT.
AND X = 700.00 FT.

EACH SURFACE TERMINATES BETWEEN X =1200.00 FT.
AND X =1600.00 FT.

UNLESS FURTHER LIMITATIONS WERE IMPOSED, THE MINIMUM ELEVATION
AT WHICH A SURFACE EXTENDS IS Y = 50.00 FT.

50.00 FT. LINE SEGMENTS DEFINE EACH TRIAL FAILURE SURFACE.

RESTRICTIONS HAVE BEEN IMPOSED UPON THE ANGLE OF INITIATION.
THE ANGLE HAS BEEN RESTRICTED BETWEEN THE ANGLES OF -45.0 AND 5.0 DEG.

FOLLOWING ARE DISPLAYED THE TEN MOST CRITICAL OF THE TRIAL FAILURE SURFACES EXAMINED. THEY ARE ORDERED - MOST CRITICAL FIRST.

SAFETY FACTORS ARE CALCULATED BY THE MODIFIED BISHOP METHOD.

FAILURE SURFACE SPECIFIED BY 18 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	644.44	385.54
2	693.41	375.40
3	743.15	370.31
4	793.15	370.33
5	842.88	375.46
6	891.84	385.63
7	939.49	400.76
8	985.36	420.67
9	1028.95	445.15
10	1069.82	473.97
11	1107.53	506.80
12	1141.68	543.31
13	1171.94	583.12
14	1197.97	625.81
15	1219.50	670.94
16	1236.31	718.03
17	1248.23	766.58
18	1252.89	800.00

*** 1.264 ***

FAILURE SURFACE SPECIFIED BY 19 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	644.44	385.54
2	694.14	380.03
3	744.12	378.66
4	794.04	381.43
5	843.57	388.32
6	892.35	399.29
7	940.06	414.26
8	986.36	433.13
9	1030.94	455.76
10	1073.50	482.01
11	1113.74	511.69
12	1151.38	544.60
13	1186.17	580.51
14	1217.87	619.18
15	1246.26	660.33
16	1271.15	703.70
17	1292.36	748.98
18	1309.74	795.86
19	1310.90	800.00

1.294

FAILURE SURFACE SPECIFIED BY 20 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	644.44	385.54
2	694.32	382.05
3	744.32	381.98
4	794.21	385.32
5	843.75	392.07
6	892.72	402.19
7	940.88	415.63
8	988.00	432.34
9	1033.88	452.22
10	1078.29	475.20
11	1121.02	501.16
12	1161.88	529.97
13	1200.68	561.52
14	1237.22	595.64
15	1271.35	632.18
16	1302.90	670.97
17	1331.73	711.82
18	1357.69	754.55
19	1380.67	798.96
20	1381.13	800.00

*** 1.358 ***

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	477.78	326.16
2	527.51	321.00
3	577.47	318.89
4	627.46	319.83
5	677.30	323.81
6	726.80	330.83
7	775.79	340.86
8	824.07	353.86
9	871.47	369.78
10	917.81	388.56
11	962.91	410.13
12	1006.62	434.41
13	1048.76	461.32
14	1089.19	490.75
15	1127.74	522.58
16	1164.28	556.71
17	1198.67	593.01
18	1230.78	631.34
19	1260.49	671.55
20	1287.70	713.50
21	1312.29	757.04
22	1333.21	800.00

*** 1.490 ***

FAILURE SURFACE SPECIFIED BY 18 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	700.00	426.98
2	748.70	415.65
3	798.24	408.90
4	848.20	406.77
5	898.13	409.30
6	947.62	416.46
7	996.22	428.18
8	1043.53	444.37
9	1089.13	464.89
10	1132.62	489.55
11	1173.63	518.15
12	1211.81	550.44
13	1246.82	586.13
14	1278.37	624.92
15	1306.17	666.48
16	1329.99	710.44
17	1349.62	756.43
18	1363.60	800.00

*** 1.526 ***

FAILURE SURFACE SPECIFIED BY 17 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	700.00	426.98
2	748.24	413.84
3	797.69	406.42
4	847.66	404.82
5	897.48	409.07
6	946.46	419.11
7	993.94	434.81
8	1039.25	455.94
9	1081.79	482.21
10	1120.97	513.28
11	1156.25	548.71
12	1187.15	588.01
13	1213.25	630.66
14	1234.19	676.06
15	1249.69	723.60
16	1259.53	772.63
17	1261.75	800.00

*** 1.531 ***

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	588.89	344.09
2	638.39	337.06
3	688.25	333.31
4	738.25	332.85
5	788.17	335.68
6	837.79	341.79
7	886.91	351.16
8	935.30	363.74
9	982.76	379.48
10	1029.07	398.32
11	1074.05	420.16
12	1117.49	444.91
13	1159.21	472.48
14	1199.02	502.73
15	1236.75	535.53
16	1272.24	570.75
17	1305.34	608.23
18	1335.89	647.81
19	1363.77	689.32
20	1388.86	732.57
21	1411.04	777.38
22	1420.45	800.00

*** 1.956 ***

FAILURE SURFACE SPECIFIED BY 22 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	588.89	344.09
2	638.42	337.27
3	688.29	333.63
4	738.29	333.19
5	788.21	335.95
6	837.86	341.90
7	887.02	351.01
8	935.50	363.25
9	983.09	378.57
10	1029.61	396.90
11	1074.86	418.17
12	1118.66	442.29
13	1160.82	469.17
14	1201.18	498.69
15	1239.56	530.73
16	1275.82	565.16
17	1309.80	601.84
18	1341.36	640.62
19	1370.37	681.34
20	1396.72	723.83
21	1420.30	767.93
22	1434.89	800.00

1.972

FAILURE SURFACE SPECIFIED BY 27 COORDINATE POINTS

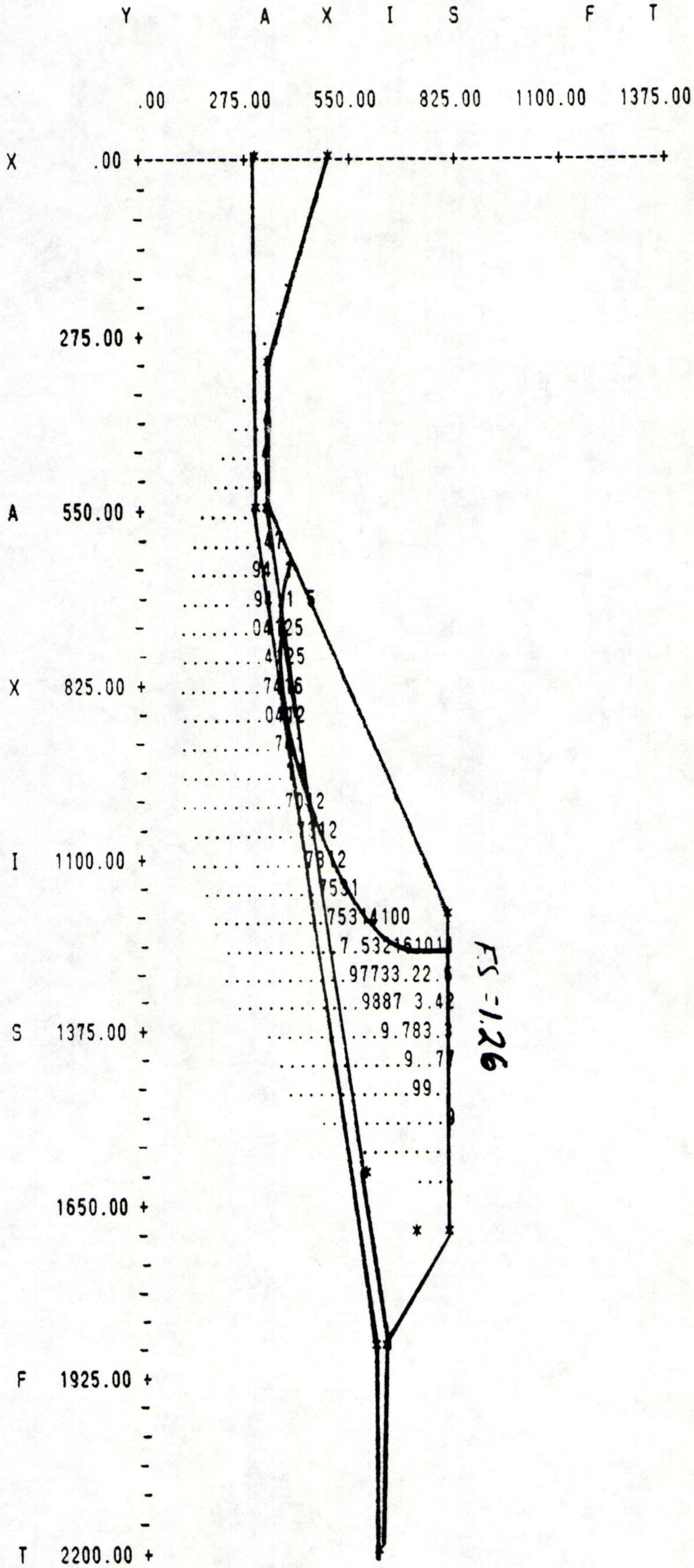
POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	422.22	323.84
2	471.76	317.08
3	521.56	312.57
4	571.51	310.32
5	621.51	310.34
6	671.46	312.62
7	721.25	317.16
8	770.79	323.95
9	819.96	332.98
10	868.68	344.23
11	916.84	357.67
12	964.34	373.28
13	1011.09	391.02
14	1056.98	410.87
15	1101.93	432.77
16	1145.84	456.69
17	1188.62	482.57
18	1230.18	510.36
19	1270.44	540.01
20	1309.32	571.45
21	1346.74	604.62
22	1382.61	639.45
23	1416.87	675.87
24	1449.44	713.80
25	1480.27	753.17
26	1509.27	793.90
27	1513.22	800.00

*** 2.009 ***

FAILURE SURFACE SPECIFIED BY 21 COORDINATE POINTS

POINT NO.	X-SURF (FT)	Y-SURF (FT)
1	533.33	328.47
2	582.01	317.03
3	631.52	310.09
4	681.46	307.69
5	731.42	309.86
6	780.96	316.58
7	829.69	327.80
8	877.19	343.41
9	923.06	363.30
10	966.93	387.30
11	1008.42	415.19
12	1047.20	446.76
13	1082.92	481.74
14	1115.31	519.83
15	1144.09	560.72
16	1169.01	604.07
17	1189.87	649.51
18	1206.49	696.67
19	1218.75	745.14

2.049



SEATA OT2

CIRCULAR

3 SOILS

	Ø	C
1	37	0
2	24	900
3	45	5000

**** ERROR - SQ03 ****

****
****** EXECUTION OF STABL2 ABORTED ******
****

Mon 4-11-1988